Scutti Deutschland GmbH

CTS SERIES TUBULAR SCREW CONVEYOR.

OPERATING MANUAL FOR INSTALLATION, OPERATING AND MAINTENANCE

Spec. 5/96

KEEP THIS MANUAL FOR FUTURE CONSULTATIONS

Dear Client,

We thank you for choosing our CTS TUBULAR SCREW CONVEYOR.

We have prepared this manual to acquaint you better with the characteristics of our machine.

You will find in the following pages useful operating advice and specific indications regarding operatives' safety.

We are sure that this manual will help you to use the machinery correctly, with complete satisfaction and in total safety.

With best wishes for successful work.

SCUTTI DEUTSCHLAND GMBH

SUMMARY **PAGE**

1.0 GENERAL INFORMATION **4**

1.1 INTRODUCTION 4
1.2 DETAILS OF COMPANY 4
1.3 RECOMMENDATIONS FOR ASSISTANCE 4
1.4 IDENTIFICATION OF THE MACHINE 4
1.5 COMPOSITION 5

2.0 SAFETY DEVICES **5**

3.0 BASIC SAFETY WARNINGS **5**

3.1 SAFETY WARNINGS AND SYMBOLS 5
3.2 USE ACCORDING TO SPECIFICATIONS 6
3.3 ORGANIZATIONAL PROVISIONS 6
3.4 SELECTION AND QUALIFICATION OF PERSONNEL 7
3.5 SAFETY WARNING IN RELATION TO SCREW CONVEYOR OPERATION 7
3.6 ELECTRICAL POWER DANGER 7
3.7 CONDITIONS OF SAFETY AND PROTECTION 7

4.0 INSTALLATION AND START-UP **8**

4.1 INSTALLATION 8
4.2 START-UP 9

5.0 MAINTENANCE **9**

5.1 CLEANING 9
5.2 LUBRICATION 10

6.0 EPLACEMENT OF COMPONENTS **11**

6.1 STUFFING BOXES 11
6.2 INTERMEDIATE SUPPORTS BEARINGS 12

7.0 DEMOLITION **13**

8.0 DIFFICULTIES **13**

1.0 GENERAL INFORMATION

1.1 Introduction

This manual contains a description of the CTS Tubular conveyor and recommendations for operation and maintenance procedures

1.2 Details of company

Scutti Deutschland GmbH
Schönbrückstrasse 30
D-67376 Harthausen
Tel.: +49/6344-508-362
Fax: +49/6344-508-365
e-mail: info@scutti-deutschland.de
Webside: www.scutti-deutschland.de

1.3 Recommendations for assistance

In compiling this instruction manual, careful attention has been paid to all considerations of operation and maintenance during normal working conditions.

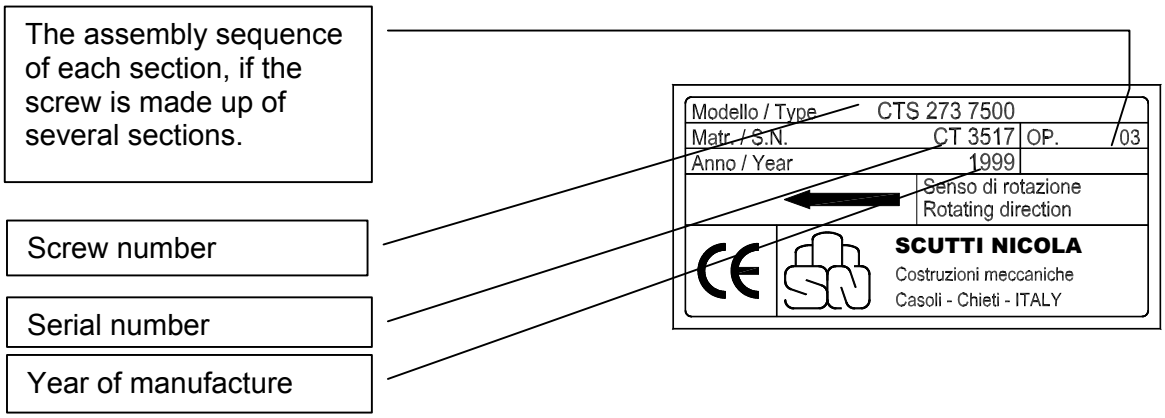
SCUTTI NICOLA recommend that you should not undertake operations, measures or modifications to any component parts of the machine without written advice or consent.

Measures requiring replacement of parts or any operation other than ordinary maintenance should be carried out exclusively by correctly qualified technical personnel who have the necessary abilities as well as appropriate equipment to carry out the operations correctly, safely and reliably.

Should you require further technical information or spares for your screw conveyor, it is necessary to provide all data as indicated on the body of the machine.

1.4 Identification of the machine

Every screw conveyor is supplied with identification plates showing: the screw number, the serial number, the assembly sequence number of each section, the year of manufacture and the direction of rotation. For example:



1.5 Composition

A CTS series screw conveyor is generally made up of:

Machine body, consisting of a tubular body made up of one or more flanged sections, within which is housed a screw flight or worm-on-pipe. The flight is rotated to transport the material from the point of intake to the point of discharge.

Drive unit, generally made up of an electrical motor coupled to an in line to a speed reduction unit (although belt drives and chain drives are also available).

Intermediate and hanger bearings to ensure true alignment and smooth rotation of the worm-on-pipe.

Inspection ports are positioned beneath all intermediate support bearings and all inlets to ensure ease of access for maintenance or emergency procedures.

End bearings and direct mounted gearboxes are fitted with packing seal arrangements to avoid product leakage from the screw.

2.0 SAFETY DEVICES

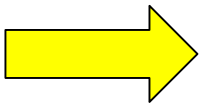
All inspection ports are equipped with sealed covers to prevent the possibilities of foreign bodies entering into the screw flight. Labels with danger warnings are also placed near to all inspection ports and on the inlet and outlet orifices.

3.0 BASIC SAFETY WARNINGS

3.1 Safety warnings and symbols

In addition to the recommendations concerning the correct operation and maintenance of the screw conveyor, we have included warnings of caution and safety for the attention of the operation and maintenance staff as to the possible dangers arising from improper use.

Within this manual the following graphic symbols are used for warnings and indications of possible danger:

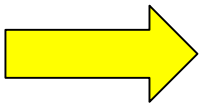


WARNING

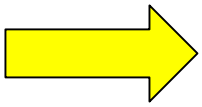
Special indications on correct use of the machine

WARNING, DANGER!
Special indication, provision and prohibition to prevent injury to personnel

These instructions and/or warnings are recommendations, which should be run in conjunction with the latest Health and Safety directives in accident prevention.



Single warnings DO NOT eliminate the danger.



Lack of adherence to the safety recommendations and/or improper use of the machine may incur the risk of accident to personnel.

3.2 Use according to specifications

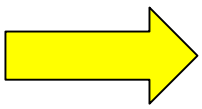
Whoever uses the machine must be aware of the existence of this manual and must fully apply all the instructions and recommendations contained in it.

It is advised to use the machine under normal working conditions and in accordance with standard specifications, whilst maintaining safety and accident prevention recommendations contained in the operating manual.

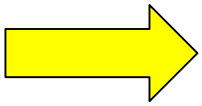
All modifications to any part of the machine without the written consent of SCUTTI NICOLA are strictly prohibited. Should modifications be undertaken without written consent, SCUTTI NICOLA will decline to accept responsibility for possible damages caused by the machine.

3.3 Organizational provisions

All operating and maintenance personnel should study these instructions before commencing operation with the screw conveyor, paying special attention to the chapter relating to the safety recommendations. In particular these recommendations should be brought to the attention of staff who operate the screw conveyor on a part time basis.



Keep these instructions for use close to where the machine is located.



The site safety officer is responsible for periodically checking that the safety standards are correctly adhered to.

3.4 Selection and Qualification of Personnel

Establish the operative's responsibility for the machine and authorise him to not undertake any instructions from a third party that could contravene safety recommendations.

3.5 Safety warning in relation to screw conveyor operation

Constant awareness as to the dangers of operating a screw conveyor must be undertaken at all times. Before commencing any operation, ensure you are concentrating your attention on what you are about to do. Under no circumstances should you operate the screw conveyor if you are under influence of alcohol or drugs.

Refrain from any operation that could compromise safety.

Ensure there is an adequate level of cleanliness within the machine and in its surrounding area, as well as suitable safety lighting, for all personnel.

The indication, recommendation and danger signaling plates must be kept clean, maintained in good condition and clearly mounted in the appropriate areas.

3.6 Electrical Power Danger

Only fully qualified electricians should attempt connection to a power supply.

Before carrying out inspection, maintenance and repair procedures check first that the power supply is disconnected before commencing.

3.7 Conditions of safety and protection

All personnel should strictly adhere to the latest health and safety recommendations

IN PARTICULAR, maintain the following recommendations:

During all operation and maintenance procedures utilize all personal protection equipment as instructed in the la test health and safety recommendations and/or by the building management.

Before carrying out inspection, maintenance and repair procedures ensure the screw conveyor is securely positioned and that its weight is fully supported.

Before proceeding with maintenance operations on the screw conveyor, make sure that the supply voltage is disconnected.

NEVER START UP THE SCREW in the following circumstances:

- **If the cover has been removed from any inspection ports**
- **If the ratio motor unit protective housing has been removed**

The above circumstances should only be undertaken during maintenance procedures.

4.0 INSTALLATION AND START-UP

4.1 Installation

Remove the protective packing from the drive unit.

If the screw is in several sections, remove the flight restriction brackets and lay the screw conveyor sections out in the correct sequence.

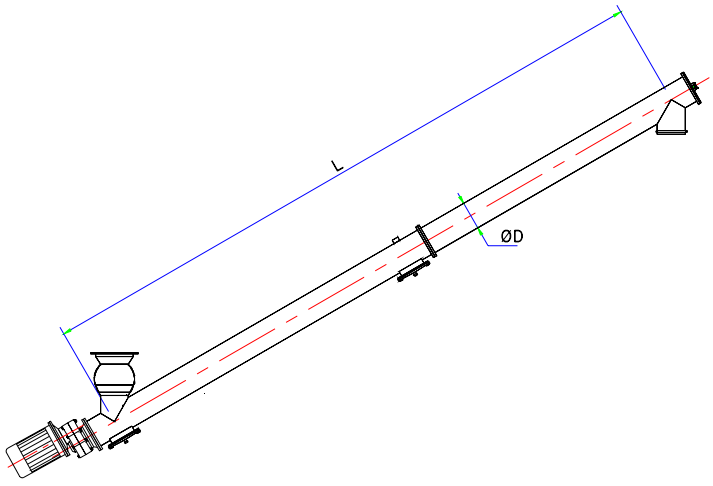
After removing the protective packaging, make sure that the screw flight is free to rotate and check that there are not foreign bodies present within the casing.

Assemble the various central sections of the screw together, ensuring that all sections have the same serial numbers and check at the same time the numeric order of the sections. Insert the paper gasket between the connecting sections and bolt the flanges together, making sure of the exact alignment between the inlet with the outlet and the alignment of the inspection ports and lifting eyes.

RECOMMENDATION: Once the screw has been assembled, lift ONLY using the appropriate lifting eyes mounted to the back of the casing. SCUTTI NICOLA will not accept responsibility or claims for damages caused by not adhering to these lifting recommendations.

MAXIMUM WEIGHTS relating to screw conveyors made from several sections. L= metres in length:

ØD	KG.
Ø114	50+ (18xL)
Ø139	65+ (30xL)
Ø168	135+ (35xL)
Ø193	150+ (39xL)
Ø219	190+ (45xL)
Ø273	265+ (52xL)
Ø323	315+ (70xL)



Locate the screw conveyor in the correct position and ensure that it is adequately supported.

For screw conveyors longer than 5 metres it is recommended that each 3m intermediate section should be supported.

Ensure that inlets are correctly connected and sealed to restrict the possibilities of damage from foreign bodies from entering the screw conveyor and accidents occurring. Ideally each inlet should be fitted with a shut off valve.

4.2 Start-up

Before starting up the screw, make sure that no foreign bodies have entered during assembly; if they have, remove them.

Ensure the intermediate and end support bearings are greased and that the drive oil is at the correct level. Check that all the inspection ports are closed and sealed.

Make the electrical connection to the screw, adhering to the specifications indicated on the motor plate, paying particular attention to the supply voltage.

IMPORTANT: All connections should be undertaken by qualified electrical personnel only. Before carrying out any operation on the motor, make sure that the **electrical supply is disconnected**. The constructor declines to take any responsibility for any damages to property or persons, arising from poor electrical workmanship.

Once the connection has been completed, start up the machine empty, ensuring that the direction rotation corresponds to the direction of the arrow as indicated on the identification plate. **If the direction of rotation is wrong, reconnect inverting the polarity of the motor.**

Start up the screw again on empty and then gradually begin to introduce the product until reaching the normal operating capacity.

If screw conveyor are assembled in succession, ensure that the feeding screw conveyor throughput is lower than the throughput of the secondary screw conveyor. This allows the secondary conveyor to discharge the product quicker than it is being fed and minimizes the potential of product buildup.

5.0 MAINTENANCE

5.1 Cleaning

At the end of each working day, run the screw conveyor until empty. This operation will prolong the life of the screw, especially in the presence of materials that have a tendency to flood feed, forming build ups that could cause problems during start-up, particularly after log periods of inactivity.

5.2 Lubrication

SUPPORTS.

It is recommended to grease the end support bearing every 150 hours and the intermediate support every 40 hours of operation. NEVER USE OIL FOR LUBRICATION. Below is a table showing the type and brand name of recommended greases:

RECOMMENDED GREASES	
TYPE	BRAND
PGX-SUPER	API
MOBILUX	MOBIL
BP-ENERGREASE L2	BP
CALYPSOLH 433	CALIPSOL
ANDOK B	ESSO
GR-MU	ARAL
GLISSANDO FL 20	TEXACO

REDUCTION GEAR UNITS.

After the first 500 hours of operation, replace the oil completely. Then, periodically check the lubricant level and change the oil every 3000 hours of work. If synthetic oil is used, the change may be made every 6000 hours of operation. If it is anticipated that the reduction gear unit should remain inactive for a long period of time in a humid environment, it is advised to fill completely with oil. Below is a table of the oils recommended, equivalent to the respective operational conditions:

RECOMMENDED OILS	
TYPE	**BRAND**
DT-220	API
OMALA 220	SHELL
TIVELA OIL WA	SHELL
PONTIAX HD	IP
ENERGOL SG 150	BP
MOBILGEAR 629	MOBIL

GEARBOX TYPE	**CAPACITY/ANGLE OF SCREW**	
	Litres	**Litres**
RM series	$0° \leq \alpha \leq 15°$	$16° < \alpha \leq 45°$
RM 400	1,2	1,4
RM 500	1,5	1,8
RM 1000	1,9	2,4
RM 2000	2,0	2,8
RM 3000	3,5	4,9

6.0 REPLACEMENT OF COMPONENTS

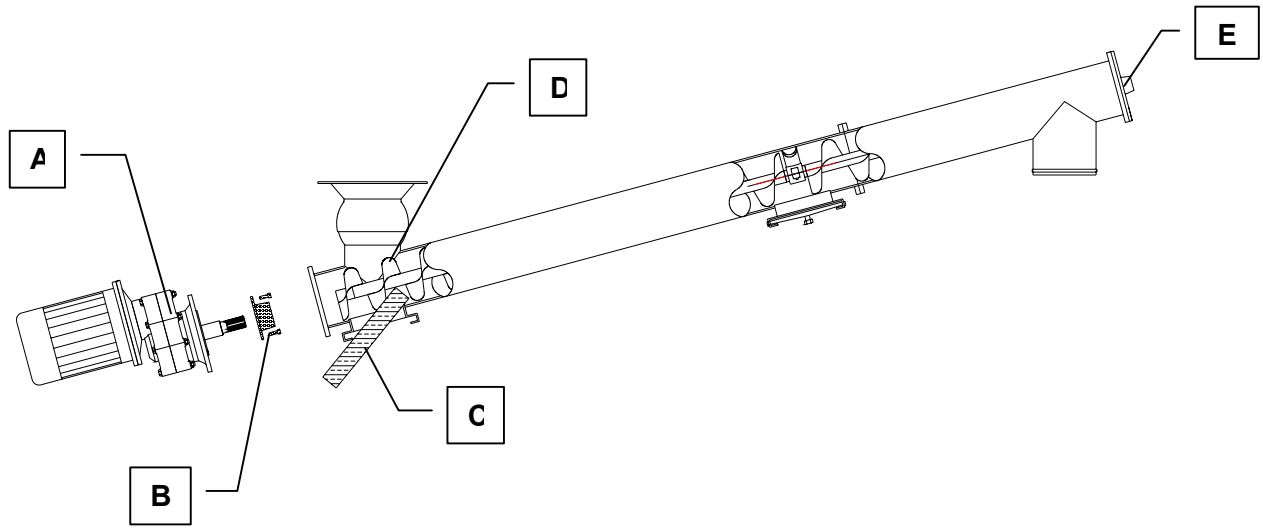
All SCUTTI NICOLA screw components are manufactured for long life operation; however some components due to the nature of their position and duties are subject to high levels of wear and tear, and therefore need to be replaced periodically.

6.1 Stuffing boxes

Mounted to the RM direct reduction gear units and the end support bearings are stuffing boxes which house felt seal packing arrangements. These units are under constant contact with the product and should be replaced approximately every 2 years, (if used with a non abrasive product). When conveying an abrasive product the stuffing boxes are subjected to a higher wear and tear and will therefore require replacing on a more regular basis. The gear units and end support bearing are all designed to allow product leakage once the stuffing box needs replacing without allowing the product to enter their internal workings. Any product leakage should be reported to a member of the maintenance staff who should replace the stuffing box immediately. Below is described stuffing box's replacement procedure:

1) Ensure that no product can feed the screw, by closing the valve on the silo.
2) Run the screw until empty.
3) Disconnect voltage supply, by removing wires on motor's terminal board.
4) Open the inspection port located beneath the inlet.
5) Insert a wooden plank (**C**) into the port and fix it so that the flight cannot slide backwards.
6) Take out the drive unit (**A**) by removing the fixing screws.
7) Remove the stuffing box (**B**) and replace it with a new one.
8) Re-assemble the components by following the procedure backwards.

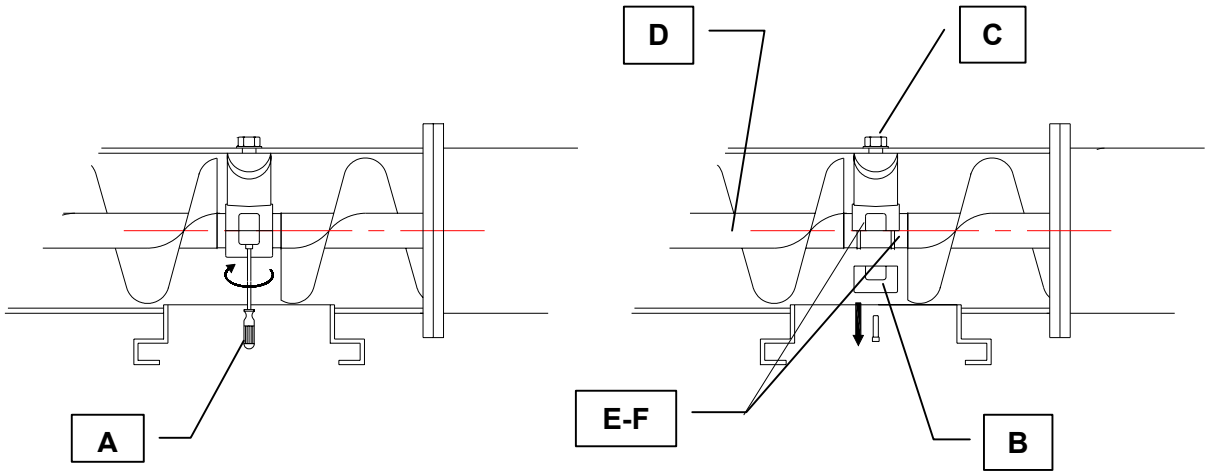
The above procedure is also to be followed when you must replace the stuffing box on the end bearing (**E**) or when the drive unit is mounted at the outlet.



6.2 Intermediate support bearings

The intermediate supports should be regularly inspected and routinely replaced every 2 years. To replace an intermediate support bearing, please follow the recommendation below:

1) Ensure that no product can feed the screw, by closing the valve on the silo.
2) Run the screw until empty.
3) Disconnect voltage supply, by removing wires on motor's terminal board.
4) Open the inspection port located beneath the support.
5) Remove the fixing screws (**B**), located on the lower cap of the support, by using a screw driver (**A**).
6) Remove the fixing bolts (**C**).
7) Remove the stuffing box (**B**) and replace it with a new one.
8) Rotate upside down the hanger bearing until the internal shaft is free.
9) Remove the hanger bearing and replace it with a new one.



7.0 DEMOLITION

At the end of the working life of the screw, demolish it according to the following recommendations:

Recover the oil from the reducing unit and all plastic parts consigning them to the authorized collection centres.

All remaining steel parts should be consigned to the iron materials disposal centres.

8.0 DIFFICULTIES

Sometimes a difficulty may be found in starting up the machine. In most cased only slight difficulties occur, that may be resolved by the operative. We give below a table of the most common problems:

PROBLEM	POSSIBLE CAUSE	SOLUTION
Motor does not start	Wiring is wrong	Check wiring on the terminal board
	One of the fuses is burnt	Replace the fuse
	Defective motor or failure in supply voltage	Repair or replace defective part
Motor does start but then stops	Blockage in the screw	Remove the obstruction
	Outlet is blocked	Remove the blockage
	Screw is rotating in the wrong direction	Invert polarity on the motor
	Excessive throughput	Reduce product intake from the silo
	Motor burnt	Replace motor
	Gearbox or end bearing defective	Replace the concerned part
Motor does start but no product is being discharged	Product does not enter the screw because it is not suitably aerated	Improve aeration in the silo
	The screw is rotating in the wrong direction	Invert polarity on the motor

CHECK LIST IN CASE OF TROUBLE:

1. **General Questions**

Description of source of error

a.) Ask plant operator when and under which circumstance feeder stops. Does feeder start without problems after longer periods.
b.) If valve is fitted to feeder outlet check the centre line of the valve shaft is parallel with the centre line of the feeder, as would be fitted in normal circumstance.

Silo check:

a.) Is the silo equipped with a deflecting or bridge breaking cone.
b.) Does the silo include a fluidization system. If so how does it operate. Automatically at intervals while feeder is turned on. Manually for Emergency in case of bridging.
c.) Is the silo cone equipped with vibrator or shaker?

Electrik equipment check:

a.) Is a drop in viltage possible through the contemporary starting of various maschines?
b.) Check mains supply of motor!
c.) Check electric motor is correctly wired and make sure wires are tightly fastened!
d.) Check adjustment of therminal cutout in the control panel and compare with data on the motor plate!
e.) Check sense of motor rotating is correct!
f.) Read amperage with feeder running on empty, then with filled up feeder Starting, as well as with full feeder running!
g.) Check cross section of mains cables are suitable for the installed motor Power!

Mechanikal parts check:

a.) Is the breather plug of the gear reducer working okey?
b.) Check outlet is free of crusts.
c.) Check weigh hopper vent is functioning correctly and check correct dimensioning of the same!

CHECK LIST IN CASE OF TROUBLE:

2. **Feeder check**

a.) Are the feeder parts correctly assembled? Do all inspection hatches point downwards?
b.) Does feeder bend? Stretch a string! If necessary additional Supports must be fitted (every 3-5 meter)!
c.) Shut silo valve! Empty feeder!
d.) Open inspection hatches! Check intermediate hanger bearings are okey and correctly mounted!
e.) Turn feeder by hand using a spanner on the shaft of the outlet end bearing assembly! If you don`t feel any restistance and don´t hear any grinding noise it is most certain that the feeder is mechanically sound.
f.) Shut inspection hatches! Start feeder! Read amperage, voltage, cycles, and screw r.p.m. with feeder running on empty! Compare ammeter reading with motor plate data!
g.) Repeat starting procedure with feeder at full load and read Amperage, voltage, and cycles.

3. **Material check**

a.) Name of material
b.) Bulk density (kg/dm3)
c.) Grain size (µm)
d.) Humidity? (%)
e.) Flowability ?
f.) Compressive material? (Can you make a snowball?
g.) Abrasive material? (does it hurt when you rub it between your fingers?